

# **Effects on the Heart from PM Exposure and a Possible Role of Genetics**

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**California Air Resources Board**

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**California Environmental Protection Agency**

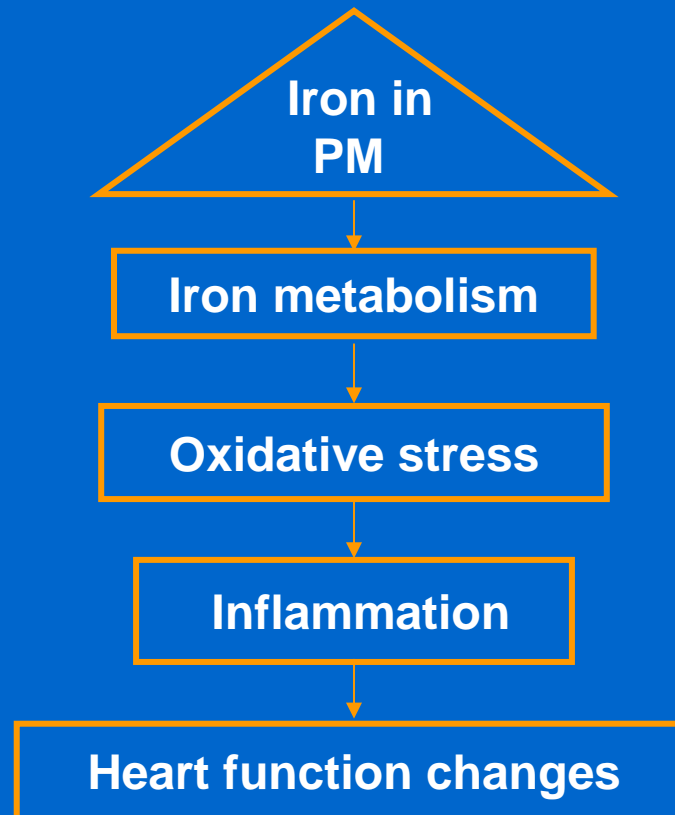
# Background

- Some people are more affected by particulate matter than others
- Genetic differences may help explain the variability
- Recent Genetic Studies\*
  - Mexico City-Asthmatic Children's Study
  - The Normative Aging Study

\*Romieu et al. Eur Respir J 2006;28:953-959

Schwartz et al. Am J Respir Crit Care Med;2005;172:1529-1533

# A Possible Mechanism of PM Health Effects and the Role of Iron



Can genetics modulate this pathway?

# Methods

- 518 men from the Normative Aging Study
- Tested for two forms of HFE gene
  - Involved in iron metabolism
  - Common form (336 men)
  - Variant form (182 men)
- Air pollutants measured
  - Fine particulate matter (PM<sub>2.5</sub>)
  - Black carbon, sulfate, ozone
- Health outcome
  - Heart rate variability (ability of the heart to respond to environmental stresses)
  - Decreased heart rate variability can be a risk factor for heart disease



# Results

## Single Gene Effects

- Variant form of HFE gene
  - No effect with PM<sub>2.5</sub> exposure
  - Protects against PM-induced heart function changes
- Common form of HFE gene
  - About 32% decrease in heart rate variability with a 10µg/m<sup>3</sup> increase in PM<sub>2.5</sub>

# Conclusion

- Genetic factors can influence susceptibility to PM-linked health effects
- Ongoing related ARB-funded research
  - Genetic influences on the response of asthmatics to ozone exposure
  - Possible role of genetics on short-term PM effects on asthmatics
- Implications
  - Need to better understand how genetics can affect susceptibility to air pollution
  - Future research on toxicity of components of PM